

NextGen 101

Addressing the NextGen Challenge

Version 1.0



NextGen Challenge

- **The current system**
 - is not performing adequately
 - is not scalable
- **The NextGen plan offers a transformational approach to resolving current inadequacies**
- **Cost of not transforming to NextGen – billions annually**



NextGen: The Short Story

- NextGen is a **Congressionally mandated** initiative to modernize the U.S. Air Transportation System in order to:
 - Increase **capacity** and **reliability**
 - Improve **safety** and **security**
 - Minimize the **environmental impact** of aviation



NextGen: The Short Story (Cont'd)

- These improvements to the air transportation system will be achieved by applying:
 - Space-based navigation and integrated surveillance
 - Digital communications
 - Layered adaptive security
 - Weather integrated into decision-making
 - Advanced automation of Air Traffic Management
 - Net-centric information access for operations



NextGen Transformation

From...  *To...*

Ground-Based Navigation and Surveillance

Voice Radio Control

Disconnected Information Systems

Human-Centric Air Traffic Control

Fragmented Weather Forecasting

Visibility Limited Airfield Parameters

Forensic Safety System

Inefficient Security Screening

Current Aircraft Environmental Footprint

Satellite-Based Navigation and Surveillance

Digital Data Exchange

Net-Centric Information Access

Automation Assisted Air Traffic Management

Probabilistic Weather Decision Tools

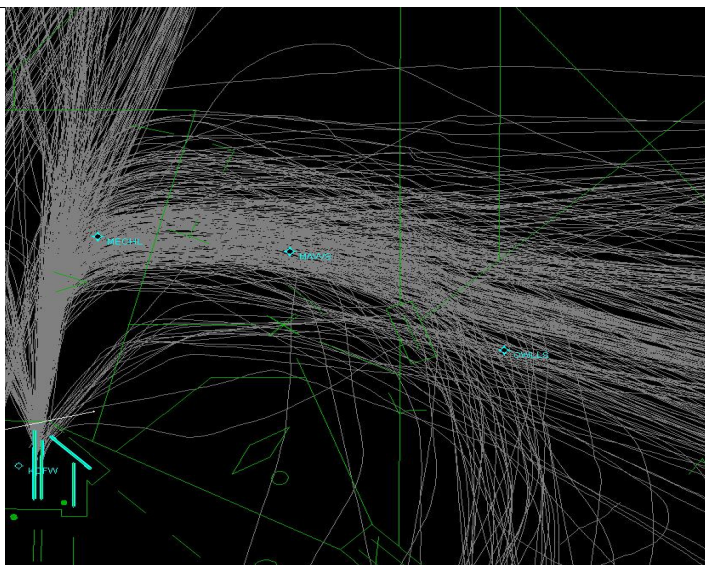
Equivalent Visual Operations

Prognostic Safety System

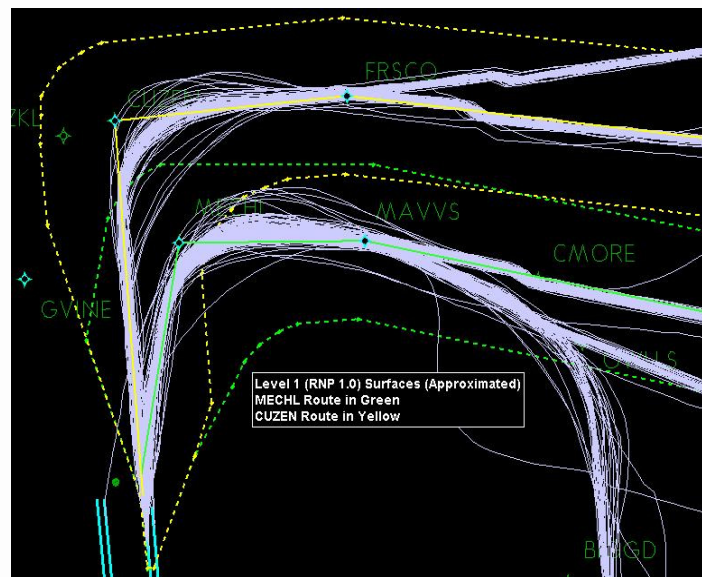
Integrated Security Risk Management

Reduced Aircraft Environmental Footprint

Savings to Users: Advanced Procedures



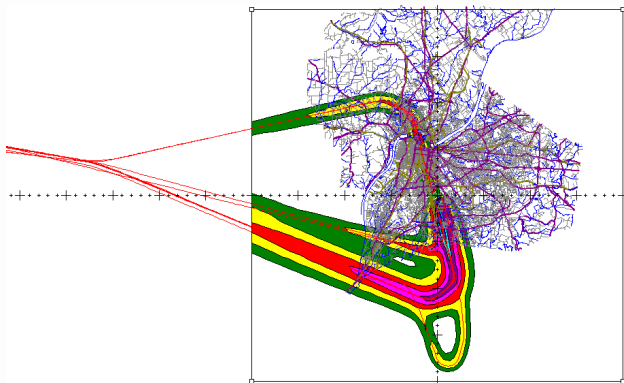
**Tracks of aircraft prior to
implementing Area
Navigation (RNAV)
at Dallas-Fort Worth**



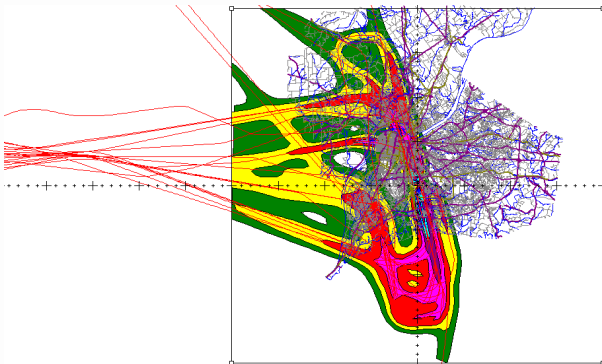
**Tracks of aircraft after
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Reducing Environmental Impacts

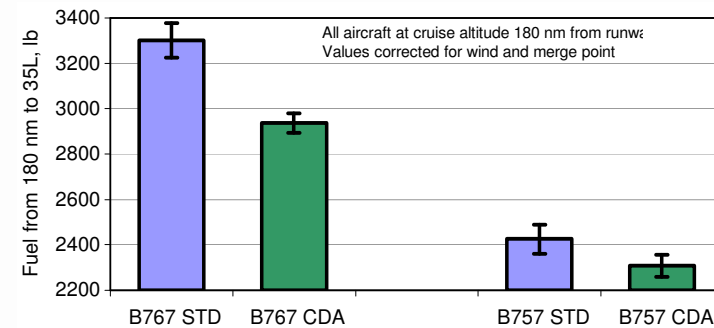
Noise pattern with
Optimized Profile Descent



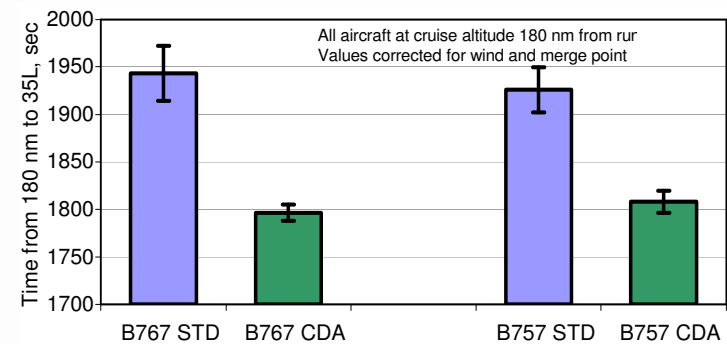
Noise pattern without
Optimized Profile Descent



Reduced Fuel Burn

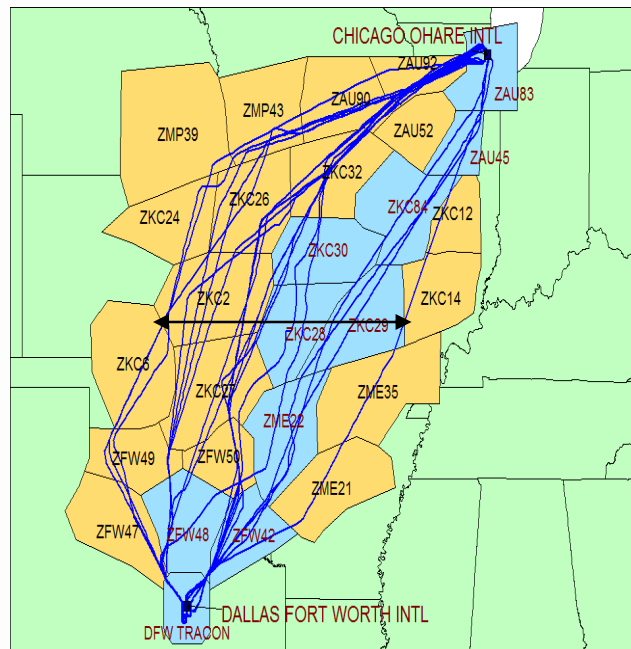


Reduced Flight Time

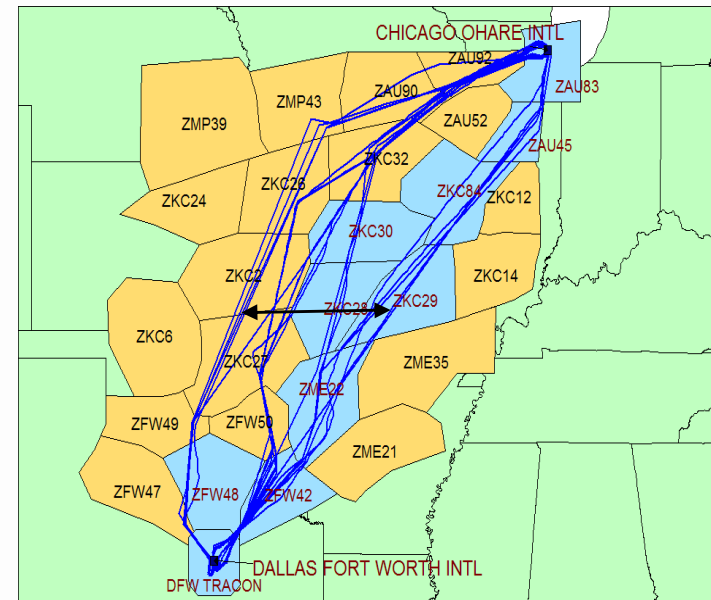


System Efficiency Through Direct Routing: Data Communications

Without data communications



With data communications



**More direct routes with
Air Traffic Data Communications
to aircraft**

	Ave Miles/flt	Ave min/flt
Good Day:	846	107
Bad Day with Data Link:	895	125
Bad Day:	922	135
Savings (Bad Day):	27	10

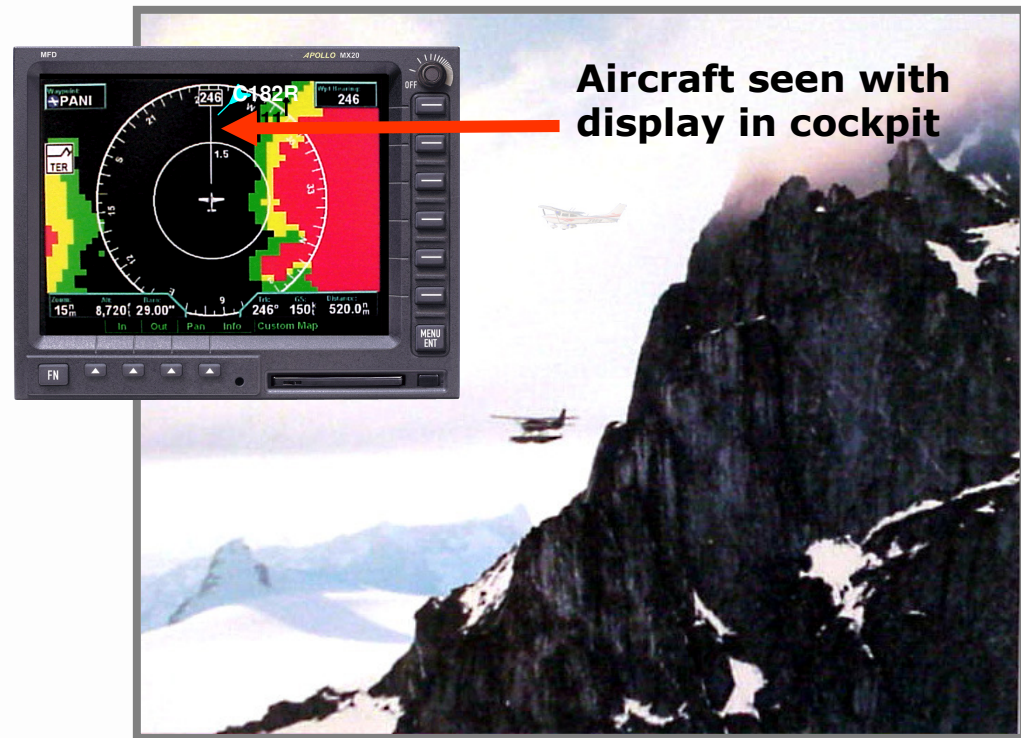


Improving General Aviation Safety

Aircraft in clouds



**40% + reduction in fatal
accidents for ADS-B users**



The NextGen Initiative

The Next Generation Air Transportation System Partners



Department of Transportation (DOT)



Department of Defense (DoD)



Department of Homeland Security (DHS)



Department of Commerce (DOC)



Federal Aviation Administration (FAA)



National Aeronautics and Space Administration (NASA)



White House Office of Science and Technology Policy (OSTP)



Office of the Director of National Intelligence (ODNI) (*ex officio*)



Coordination

Governance	Senior Policy Committee (SPC) chaired by the Secretary of Transportation
FAA	NextGen Review and Management Boards
DoD	U.S. Air Force Lead Service Office
DOC	Senior Executive Weather Panel (with USAF, USN, FAA, and JPDO)
NASA	Aeronautics Research Mission Directorate, Research Transition Teams
DHS	Investment in Network-Enabled Operations Demonstration (w/DoD and FAA) Integrated Surveillance Integrated Product Team (IPT)
ODNI	Integrated Surveillance IPT
OSTP	National Plan for Aeronautics R&D



NextGen Institute

Mechanism for Industry Involvement

- Primary Role of the Institute
 - To provide a mechanism for private sector to actively engage with government in defining, developing, and implementing NextGen with the JPDO
 - 16-member Institute Management Council (IMC)
 - 250+ private sector Working Group participants
- Nine Working Groups
 - Each has a Government and an Industry Co-Chair



JPDO Working Group Co-Chairs

Aircraft <i>Steve VanTrees, FAA (Acting)</i> <i>Frank Alexander, Aviation System Consulting Services, LLC</i>	Airports <i>Benito DeLeon, FAA</i> <i>Tom Browne, TJB Aviation</i>
Air Navigation Services <i>James Wetherly, FAA</i> <i>Bob Beard, CSC</i>	Environment <i>Lourdes Maurice, FAA (Acting)</i> <i>Betty Hawkins, ATA</i>
Global Harmonization <i>Carey Fagan, FAA</i> <i>Mike Marsili, Lockheed Martin</i>	Net-Centric Operations <i>Patricia Craighill, DoD (Acting)</i> <i>David Sweet, Boeing</i>
Safety <i>Jay Pardee, FAA</i> <i>Paul Russell, Boeing</i>	Security <i>Paul Polski, TSA</i> <i>Paul Druckman, Accenture</i>
Weather <i>Mark Andrews, NOAA</i> <i>Steve Brown, NBAA</i>	

Foundational Strategic Planning

Joint Planning Environment

Concept of Operations

Enterprise Architecture

Integrated Work Plan

**Gov't/Industry Investment
Business Case**



NextGen Weather Concept

- Integrated and consistent common weather data picture for observation, analysis, and forecast available to all system users
- Net-centric (net-enabled) capability is envisioned:
 - Information network that makes information available, securable, and usable in real time
 - Information may be pushed to known users and made available to be pulled by others
- “Virtual” repository, no single physical database
- Integration of weather information into operational decision-making processes



The Cost Of NextGen

- JPDO has reviewed several initial outside estimates:
 - FAA's Research, Engineering, and Development Advisory Committee (REDAC)
 - MITRE Avionics Estimate
 - FAA's Air Traffic Organization (ATO)
- The First Five Years – \$4.6 billion:
 - \$4.3 billion in ATO capital appropriation
 - \$300 million in research, engineering, and development
- Longer-Term Cost Estimates:
 - Next 10 years: \$8-10 billion
 - End-state or through 2025: \$15-22 billion
- Avionics costs = \$14-20 billion

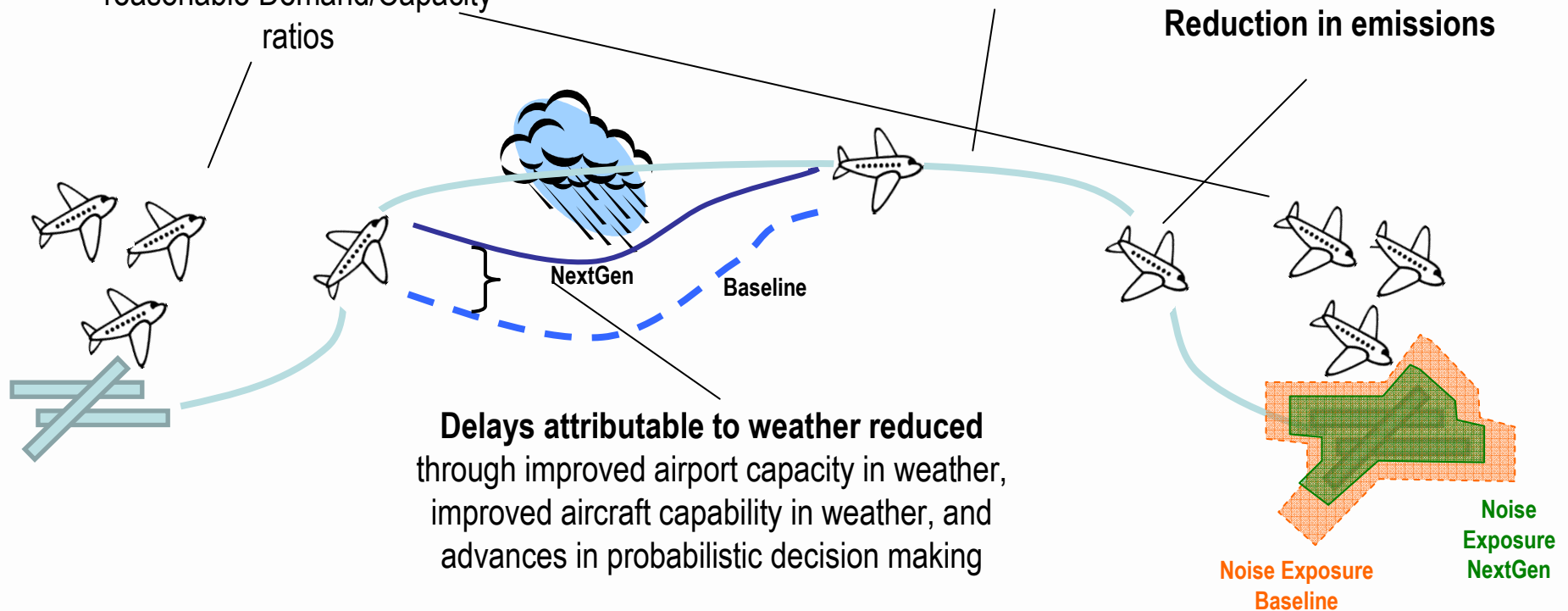


NextGen Performance Benefits

Through High Density Operations, new runways, and other operational improvements, airport capacities increased, allowing **increased throughput** while maintaining reasonable Demand/Capacity ratios

Through Trajectory Based Operations, satellite navigation, data communications, and other operational improvements, **en route capacities increased**

Future individual aircraft (airframes, engines) and ATC exhibit:
Noise reduction
Reduction in fuel burn
Reduction in emissions



Global Harmonization

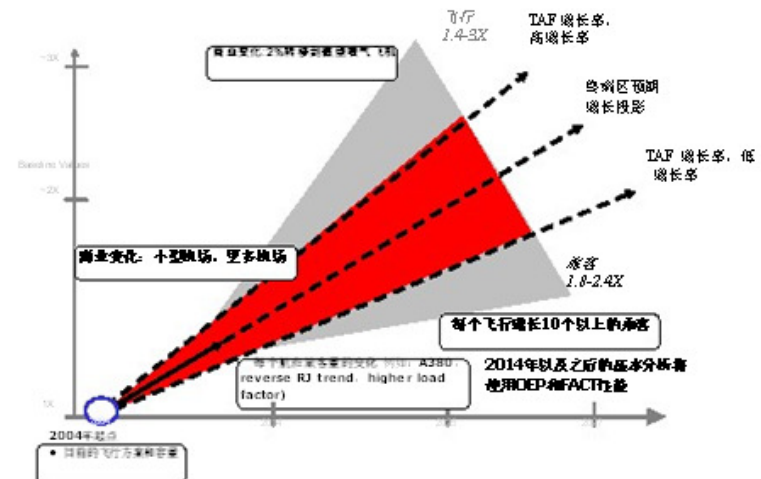
- International collaboration is essential to ensure compatible standards

- Reducing the cost of equipage

- Strategic partnerships with:

- ✓ Europe
- ✓ Japan
- ✓ China
- ✓ North America: Canada and Mexico

图1-2: 未来发展计划



- Cooperation with the International Civil Aviation Organization (ICAO)

- ✓ Review of key NextGen products
- ✓ Collaboration in the development and acceleration of standards

- Partnership Expansion - Second Phase

- ✓ India
- ✓ Australia
- ✓ Brazil



Joint Planning and Development Office NextGen

www.jpdo.gov